ICARDA

Science for resilient livelihoods in dry areas

Silvopastoral Systems: Improvement and Evaluation
Group Training Course Report

Prepared by: Mounir Louhaichi (ICARDA – Tunisia), Sawsan Hassan (ICARDA - Jordan) and Mouldi Gamoun (ICARDA – Tunisia)

CGIAR RESEARCH PROGRAM ON Livestock

Contents

Introduction

Inadequate feed quality and quantity is the most important constraint faced by livestock keepers worldwide (Swanepoel et al. 2010). Improving livestock nutrition by identifying and evaluating better feed and forage options are key factors. Integrating feed and forage research can lead to improved animal health and genetic systems (Torres 1983; Petit 2003).

Integrated systems of agricultural production which include trees, shrubs, crops, and livestock grazing in the same area are venerable production systems and are considered the main form of agricultural land use in the world (Bell and Moore 2012). Silvopasture embodies the goals of increasing efficiency of the production systems by contributing to improved forage, biodiversity, and carbon capture and has the potential to intensify leading to significant improvements in livestock production compared to conventional agriculture (Herrero et al. 2016; Kay et al. 2019).

However, the lack of information on the composition and use of locally available feed resources in addition to the overuse of these systems led to a steady decline in terms of area and their capacity to provide ecosystem goods and services. This is mainly due to unsustainable use such as encroachment of cultivation, overgrazing, and climatic change (recurrent droughts). Pasture degradation reduces the diversity and forage that pastures provide. Severe pasture and rangeland degradation can be irreversible. Thus, specific management interventions should be tied to improve and evaluate progress. For instance, there is a need to have accurate and timely information about the contribution of pastures to the livestock diet to fill the gap with alternative feed resources during crucial times of the year. An accurate assessment of pasture conditions and trends is needed for the land manager to act (rehabilitation of degraded pasture) and increase feed availability and ecosystem services.

Research and development-based capacity strengthening is one of the priority missions of the International Center for Agricultural Research in the Dry Areas (ICARDA). One objective of the Rangeland Ecology and Forages unit is to strengthen the capacity development of individuals and institutions and provide them with the information and skills they need to address environmental and livelihood challenges.

Under the framework of the CGIAR Research Program on Livestock a group training course titled "Silvopastoral Systems: Improvement and Evaluation" was conducted during the first week of November 2021. The course was coordinated by the ICARDA Rangeland Ecology and Forages (REF) team. Over the past decade, the REF team has developed a set of practical guidelines and protocols aimed at enhancing silvopasture assessment and monitoring. The tools include not only conventional techniques using transects and quadrats but also modern technologies such as GPS and remote sensing.

Objectives

This course aimed to develop and improve the skills of participants in:

- learning the principle of experimental design, data collection, and analysis,
- the overview of sustainable rehabilitation techniques for silvopasture systems in semi-arid Tunisia,
- demonstrating silvopasture monitoring and assessment methods,
- learning directly from experts representing national development agencies, and
- sharing experiences on improvements used in different regions.

Course topics

The training course included information about silvopasture production systems and VegMeasure® software applications. The course aimed to improve the participants' proficiencies in the identification and classification of rangeland plants by conducting field surveys and statistical analyses to identify plant species and the vegetation communities they belong to.

The course included theoretical (lectures) and practical aspects of:

- sustainable silvopastoral practices,
- grazing management and carrying capacity determination methods,
- silvopasture measurements (methods and indicators),
- principles of experimental design and data analysis, and
- an overview of VegMeasure® software.

Participants

Twenty-five participants attended. The trainees represented several institutions including the General Directorate of Forestry (DGF), the Office for Livestock and Pasture (OEP), the Regional Commissariat for Agricultural Development (CRDA), and from the School of Higher Education in Agriculture Mateur (ESAM).

Course implementation

The five-day training course was held at the Iberostar Averroes Hotel in Hammamet, Tunisia, during November 1–5, 2021. The course was delivered by Dr. Mounir Louhaichi, Dr. Sawsan Hassan, and Dr. Mouldi Gamoun from ICARDA, and Dr. Slim Slim from ESAM. Techniques used to train participants during this course included lecture discussions, group exercises and assignments, and PowerPoint presentations

Activities of the training course

Day 1: November 1, 2021

Welcoming remarks and participants' introductions

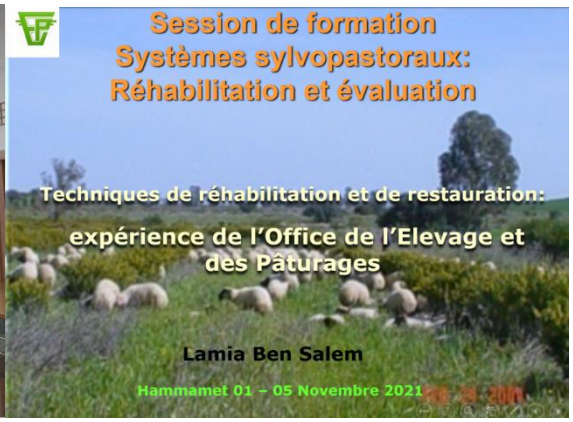
Dr. Mounir Louhaichi, ICARDA Principal Scientist, along with Mr Gouhis Fethi (OEP) and Mr Kalifa Jellali (DGF), opened the course by welcoming the participants. They highlighted the purpose of the training course as capacity development. Additionally, the course is an opportunity to allow professionals from various institutions to meet, exchange knowledge, experience, and educate themselves on a selected topic or theme. They mentioned the importance of silvopastoral systems management, especially for arid and semi-arid zones. Finally, they thanked all participants for their attendance and wished all participants a successful training workshop. Following the opening ceremony session, participants were asked to introduce themselves and to describe their expectations and what they anticipate achieving at the end of the training workshop.

Lectures

A lecture was given on the challenges and the opportunities for silvopasture in the Mediterranean basin. During this lecture, Dr. Mounir Louhaichi presented a wide range of definitions of silvopasture ecosystem characteristics, restoration, and management. He gave reasons why silvopasture has been growing worldwide over the past few years. Then, he illustrated a successful ICARDA case study by highlighting the intervention and techniques applied to an area of 50 hectares of a silvopastoral pilot site (Sbaihia, located in Zaghouan).

Dr. Louhaichi spoke of the importance of selecting a suitable intervention based on scientific and social bases, for example, the shrubs and trees selection was based on their environmental adaptability, multipurpose use, and socio-economic factors, therefore indigenous species with a high economic return such as *Ceratonia siliqua*, *Opuntia ficus-indica, Medicago arborea*, and *Pistacia lentiscus* were established in the site. However, it was iterated that silvopasture ecosystem restoration is a complex process and it is necessary to engage and involve multidisciplinary stakeholders in the process and ensure local knowledge informs on the specificities of each site. He concluded that sustainable management is the key to silvopastoral restoration. However, there is a need to develop further capacity in national institutions to apply scientific-based monitoring tools and grazing management practices including empowering the community to actively participate in the restoration process.

The session then continued with Mrs. Lamia ben Salem presenting and highlighting the experience and restoration techniques that the Office of Livestock and Pastures (OEP) is applying in pasture rehabilitation. Pastures in Tunisia play an important economic, social, and environmental role covering about 5.7 million hectares. Participatory state-owned pasture lands make up 48 percent of the total pasture area, compared to 21 percent privately owned pasture, 23 percent forest pasture, and 8 percent Alfa plants pasture.



In her presentation, Mrs. Lamia described a case study about the pasture's conditions before and after interventions applied by the OEP, their role in pasture degradation mitigation, and cited the different strategies to reach their goal.

A case simulation was then carried out using an actual case from the Oued Sbaihia site. Dr. Slim presented the case along with a brief description of the situation. The participants were divided into three groups. Considering the internal and situational factors that influence the site conditions each group was asked to suggest and propose an improvement strategy using different management techniques. By using the SWOT analysis methodology, participants analyzed each suggested technique by assessing four aspects (strengths, weaknesses, opportunities, and threats) of this technique. The groups identified and discussed among themselves the suitable techniques and tried to determine the overall strategy to improve the site. Afterward, they chose one representative to present the outcome of their suggested plans.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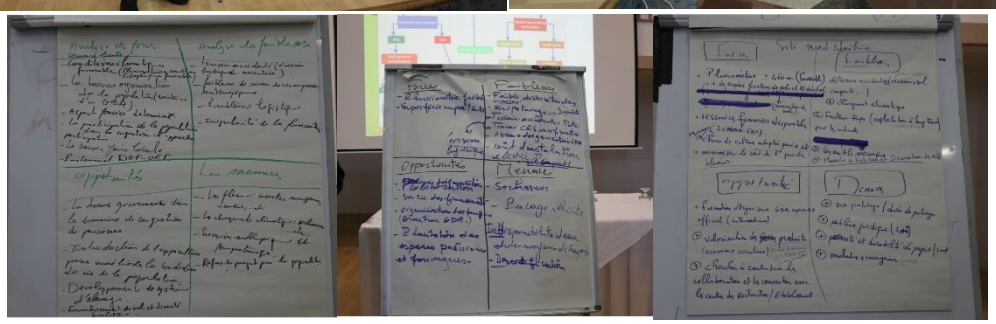
Silvopastoral systems : Improvement and Evaluation







Dr. Mouldi Gamoun (a Rangeland Scientist at ICARDA) gave a presentation on the importance of rangeland. He stated that Tunisia's rangelands have a major ecological value with an aggregate economic value besides its cultural and heritage value for the indigenous and non-indigenous population. He highlighted the importance of the rich floristic diversity in Tunisian pastures and rangelands. Dr. Mouldi mentioned a number of endemic species and described the main palatable species that can be found in the arid and desert ranges of Tataouine (the largest rangeland area in Tunisia). He also described the main perennial and annual species of arid rangelands in Tunisia, citing their common and scientific names. At the end of his presentation, Dr. Mouldi explained the five sequential steps in the design and monitoring of the rehabilitation strategies. Finally, he stressed the management of pastures and rangelands, in the present and into the future, is of great interest and consequence to the whole Tunisian community.

Day 2: November 2, 2021

Lectures and practical sessions

Day 2 began with a presentation on silvopasture inventorying, monitoring, and assessment methods. During the presentation, Dr. Mouldi and Dr. Sawsan explained that identifying species found within the same habitat is important in describing the site, and determining why plant communities have a structure through the mechanisms of species distribution within them. Therefore, there is a need to have plant identification specialists when conducting any site inventorying, monitoring and assessment. Afterward, Dr. Mouldi explained the methods of vegetation cover, density, and biomass measurement methods. He demonstrated how to use the results to estimate rangeland and pasture productivity and how to calculate carrying capacity based on sustainable use of the site. Dr. Sawsan explained the differences between the traditional and new monitoring and assessment methods and how to use the new technologies such as remote sensing and image processing tools in pasture and rangeland site monitoring and assessment.

In the second session, participants were introduced to the core concepts and principles of experimental design and data analysis. These included how to decide on experiment treatments, replication, randomization, and blocking. Then Dr. Sawsan demonstrated how to use Excel for data management and preparation for analysis and results. She explained how to prepare different types of graphs and how to add the error bars. Participants were assigned tasks to demonstrate and practice the methods presented during this session. This was followed by participants' presentations and general discussions involving all participants.

Day 3: November 3, 2021

Field trip to Zaghouan, Ouled Sbaihia pilot site

This trip gave the participants a practical demonstration on identifying the key rangeland species grown at the Sbaihia site, pasture inventorying, data collection using transects and quadrats, and demonstrations of image acquisition.

Participants arrived at the Ouled Sbaihia site where ICARDA in collaboration with the General Directorate of Forests (DGF) and the Livestock and Pasture Office (OEP) applied different restoration practices. Mr. Kalifa Jellali (DGF) welcomed the participants and summarized the site's history. He explained the positive impact of the interventions and the success of different shrub plantings.

Mr. Fethi Gouhis gave a word of thanks and appreciation for the efforts made by all parties to rehabilitate this site and he encouraged all participants to learn from the practices applied in this site and share the information with other sites with similar conditions.

Then, the participants were asked to explore the area, observe the different species and carry out monitoring and assessment methods.

Dr. Gamoun welcomed the participants and demonstrated the principles of site description. Participants were then split into two groups to practice measurements. Each group included one trainer who supervised the data collection. The first group was supervised by Dr. Mouldi and the second was by Mr. Abdelkader Mohamed. Each group practiced and collected the data on vegetation measurements and biomass estimation using destructive and non-destructive methods. The data collection practices were evaluated by the trainers and the trainees.

A practical session demonstrated the correct way of picture acquisition using VegMeasure® software to analyze and estimate vegetation cover. During the last part of the trip, Dr. Sawsan showed the impact of planting different shrubs.

When the trip ended participants expressed their appreciation of being able to observe the impact of different restoration practices and how much the discussion among all participants enriched their knowledge.

Day 4: November 4, 2021

Lectures and practical sessions

The fourth day started with a practical exercise on how to calculate the carrying capacity by using the data collected during the field trip. Dr. Slim Slim explained more about the carrying capacity calculation methodology considering the animal type and the site conditions. Later on, two tasks were assigned to the participants to practice this methodology. The results were presented by two representatives.

Following this session, Dr. Mouldi clarified how to calculate the pastoral value and presented the livestock requirement in feed units and dry matter according to the animal type.

After the lunch break, participants were introduced to the cactus pear's importance and potential. Dr. Sawsan underlined the value of cactus as a multipurpose crop including the secondary products that can be extracted. In addition to being a vitamin-rich and antioxidant source, cactus is also a very important source of animal feed. The high-water content in cactus cladodes helps to reduce water consumption by animals and more important, it enhances milk and meat production, increasing a livestock keeper’s income.

In her presentation, Dr. Sawsan highlighted the environmental requirements of cactus, agronomic practices, and methods of evaluating and characterizing different cactus varieties according to their use.

The last session of the day was presented by Dr. Mounir Louhaichi. He gave a lecture about rangeland vegetation mapping and described image classification types, data collection, sources, and specified the limitations and principles of these methods. Then, Dr. Sawsan presented the VegMeasure® software and explained the image processing process. This was followed by a practical session on how to process the images using VegMeasure® software. Participants were divided into three groups and worked together to apply the steps to analyze and obtain the results of the image processing.

Day 5: November 5, 2021

Lectures and practical sessions

The final day began with a practical exercise to demonstrate the information they received during the previous day. Participants had three sites described to them (Dhahar Beni Khdeche - Medenine site, Ouslatia Kairouan site, and the Zaghouan site). Dr. Slim asked the participants to prepare a strategy for developing the site using the SWOT technique and to present a management plan based on the fodder availability, grazing time, carrying capacity, and climatic conditions.

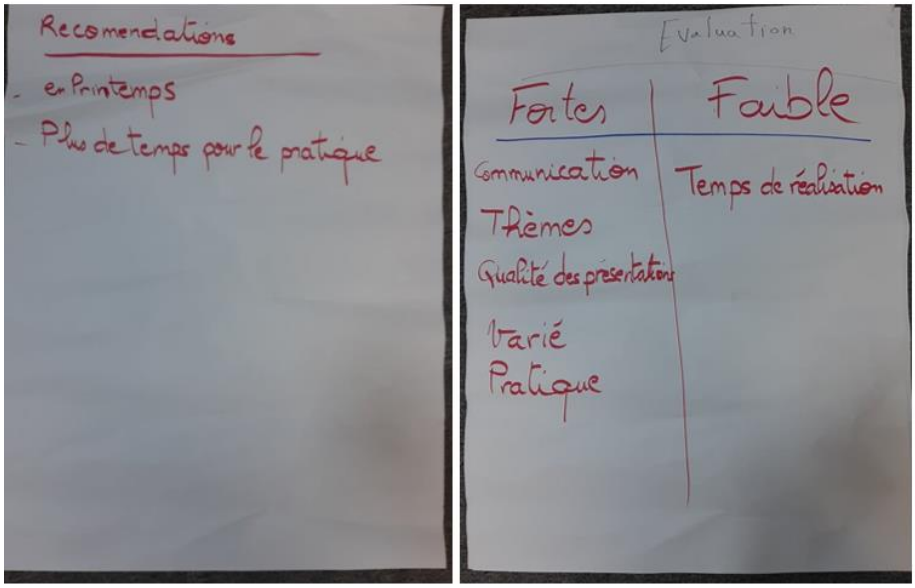
Participants were divided into three groups and each group was given a photo of one site along with a brief description of site characteristics. The participants compiled and discussed the main issues in their working groups and gave short presentations to the other participants. Finally, results were evaluated by a committee selected by the participants.

Following the coffee break, Mr. Kalifa Jellali presented the Directorate General of Forests (DGF) experience in silvopastoral restoration in Tunisia. He listed the rehabilitation and restoration techniques in the National Pasture Improvement Plan made by the DGF and its 2002–2020 achievements. This program contributed to the national effort to combat desertification and to enhance the productivity of pastures. He mentioned the importance of the collaboration program between DGF and ICARDA and he highlighted the impact of this program which resulted in the adoption of the participatory approach in other sites (e.g., Souk Jomaa and Jendouba).

Overview of the training

The evaluation of this course was positive. Participants thanked the organizers for giving them the chance to participate in this course as a way to improve their level of knowledge.

Participants stated the importance of including the right mix of participants for each training course to benefit from it. Having participants belonging to different regions and institutes is a new approach, one recommended to be followed. Participants agreed on the importance of increased research integration and collaboration among institutes, especially between OEP and DGF, as this would help to achieve the common goals for both institutes.



Participants acknowledged the advantages of participating with different backgrounds and experiences which enrich discussion and knowledge exchanges, however, some participants found difficulties in understanding the statistical data analysis while others found it very interesting, particularly those students who believe in the importance of data analysis and interpretation.

During the evaluation, participants mentioned the importance of establishing the national herbarium and this would be a very important outcome of this training. They highlighted that species conservation in a national gene bank is one important step toward protecting Tunisia's plant resources, which will be an important contribution to their use to help mitigate climate change. The participants also emphasized there is a need to have tools to achieve this mission, such as laptops, high-resolution cameras, and GPS units for recording the location of identified plant species.

Closing ceremony and certificates for participants

The closing ceremony was led by Mr. Ezzeddine Chalghaf, OEP's General Director. The ceremony was opened with a note of thanks to the trainers for their efforts and encouraged them to conduct similar training in other regions of Tunisia especially in the south (Tataouine). He highlighted the importance of the partnership with ICARDA to enhance the capacity of government staff. He also thanked the attendees for their active participation in the training and congratulated them on the successful completion of the training course and hoped that the knowledge gained would help implement the activities of their institutes effectively and efficiently.

Dr. Mounir thanked all participants, and he appreciated the collaboration with the national partners. He highlighted the importance and the need to collaborate with the National Gene Bank of Tunisia (NGBT) to conserve Tunisia's flora. This could be achieved through collaboration among different institutes and requested all participants to actively cooperate with CRDA and OEP to achieve this goal.

On behalf of the graduate students, Dr. Slim thanked ICARDA for the valuable and important training. He emphasized the importance of students' engagement in such training as this will help them to develop their education and widen their knowledge to improve their research outputs. The students expressed their desire to devote more time to practice what they learned during the training. Mr. Khalifa suggested that it would be better to hold courses like this in the spring.

Dr. Mounir concluded the discussion by highlighting the roles of OEP and DGF in conducting the training course. He acknowledged the importance of the training by experienced resource persons and the enthusiastic commitment of participants. He asked them to use the knowledge gained and achieve the action plan agreed to in the training. He encouraged all the concerned parties to achieve and deliver on their tasks to reach the desired goal.

After the session, Dr. Mounir Louhaichi, Mr. Ezzeddine Chalghaf, Mr. Kalifa Jellali, Dr. Slim Slim, Dr. Mouldi Gamoun, and Dr. Sawsan Hassan distributed training certificates.

References

Bell, L. W., Moore, A. D. 2012. Integrated crop-livestock systems in Australian agriculture: trends, drivers and implications. Agricultural Systems, 111,1-12. https://doi.org/10.1016/j.agsy.2012.04.003

Herrero, M., Addison, J., Bedelian, C., Carabine, E., Havlík, P., Henderson, B., van de Steeg, J., Thornton, P. K. 2016. Climate change and pastoralism: Impacts, consequences and adaptation. Revue Scientifique Et Technique (International Office of Epizootics), 35, 417–433. 10.20506/rst/35.2.2533

Kay, S., Rega, C., Moreno, G., den Herder, M., Palma, J. H., Borek, R., Crous-Duran, J., Freese, D., Giannitsopoulos, M., Graves, A., Jäger, M. 2019. Agroforestry creates carbon sinks whilst enhancing the environment in agricultural landscapes in Europe. Land Use Policy, 83, 581– 593. https://doi.org/10.1016/j.landusepol.2019.02.025

Petit, S. 2003. Parklands with fodder trees: a Fulbe response to environmental and social changes. Applied Geography, 23, 205-25

Swanepoel, F., Stroebel, A., Moyo, S. 2010. The Role of Livestock Development Communities: Enhancing Multifunctionality. 1st ed. Bloemfontein, South Africa: UFS and CTA.

Torres, F. 1983. Role of woody perennials in animal agro-forestry. Agroforestry Systems, 1:131-163.

List of Participants

Personal information including Name, Business Title, Email, Phones, Images and GPS points included in this report have been authorized in writing or verbally by the data subject.

ICARDA
Science for resilient livelihoods in dry areas

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École Supérieure d'Agriculture de Mateur

CGIAR
RESEARCH PROGRAM ON Livestock

Group Training Course on

Silvopastoral systems: Improvement and Evaluation

دورة تكوينية

نظم المراعي الغابية: طرق التحسين و التقييم

01 – 05 November 2021, Hammamet, Tunisia

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Group Training Course on

Silvopastoral systems: Improvement and Evaluation

دورة تكوينية

نظم المراعي الغابية: طرق التحسين و التقييم

01 – 05 November 2021, Hammamet, Tunisia

List of participants

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Silvopastoral systems: Improvement and Evaluation

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01 – 05 November 2021, Hammamet, Tunisia

List of participants

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Group Training Course on
Silvopastoral systems: Improvement and Evaluation
Hammamet 01 – 05 November 2021

Rational: Silvopastoral systems is a type of land-use, which include trees and/or shrubs, crops, and live-stock. Silvopasture embodies the goals of increasing efficiency of the production system by contributing to improved forage and animal productivity, biodiversity, and carbon captures. However, the overuse of this systems due to mismanagement led to the decline of its productivity. Thus, specific management interventions should be tied to improve and evaluate progress.

Objectives:

- Learn the principle of experimental design, data collection and analysis
- Overview of sustainable rehabilitation techniques for silvopasture systems in semi-arid Tunisia
- Demonstrate silvopasture monitoring and assessment methods
- Learn directly from experts representing national developing agencies

The Course topic: The training course is designed to include scientific information about silvopasture production systems , VegMeasure software applications, and use. The course includes theoretical (lectures) and practical aspects on:

- Sustainable silvopastoral practices
- Grazing management: Carrying capacity determination methods
- Silvopasture measurements: methods and indicators
- Principles of experimental design and data analysis
- Overview of VegMeasure software

Trainers:

- Dr. Mounir LOUHAICHI - Dr. Sawsan HASSAN - Dr. Mouldi GAMOUN
- Mr. Fethi GOUHIS (OEP) – Mr. Jamel KAILENE (DGF) – Slim SLIM (ESAM)

Requirement:

- Each trainee should be fluent in English and bring his/her own laptop.

Group Training Course on
Silvopastoral systems: Rehabilitation and Evaluation

Hammamet 01 – 05 November 2021



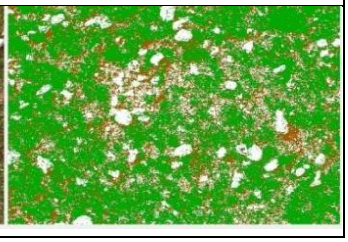

Sunday 31 October 2021		
17:00 and after	Arrival hotel	Ulysse Events
Monday 01 November 2021		
09:00 – 09:30	Registration	Ulysse Events
09:30 – 10:30	Opening remarks Training course outline	Dr. Mounir Louhaichi Dr. Aymen Frija Pr. Elyess Hamza
10:30 – 11:00	Group Photo & Coffee Break	
11:00 – 11:30	Challenges and opportunities for silvopasture in the Mediterranean basin	Dr. Mounir Louhaichi
13:30 – 14:15	Silvopasture rehabilitation & restoration techniques: Experience de l'Office de l'Elevage et des Pâturages (OEP)	Mr. Lamia ben Salem
12:30 – 13:30	Lunch	
13:30 – 15:00	Working Groups: A case simulation was then carried out using an actual case from the Oued Sbaihia site	All participants
15:00 – 15:30	Coffee break	
15:30 – 16:15	Silvopasture improvement & management methods and approach: Examples south Tunisia	Dr. Mouldi Gamoun




Group Training Course on
Silvopastoral systems: Rehabilitation and Evaluation Hammamet
01 – 05 November 2021

Tuesday 02 November 2021		
08:30 – 10:30	Silvopasture inventorying, monitoring and assessment methods: Vegetation cover (part 1)	Dr. Mouldi Gamoun and Dr. Sawsan Hassan
10:30 –11:00	Coffee break	
11:00 – 12:30	Silvopasture inventorying, monitoring and assessment methods: Density and biomass (part 2)	Dr. Mouldi Gamoun and Dr. Sawsan Hassan
12:30 – 13:30	Lunch	
13:00 – 14:30	Principles of experimental design and data analysis	Dr. Sawsan Hassan
14:30 – 15:00	Coffee break	
15:00 – 16:30	Data analysis results presentation and practical demonstration	Dr. Sawsan Hassan
Wednesday 03 November 2021		
08:00 – 16:00	Field trip to Zaghouan (Ouled Sbaihia site): - Identification of key rangeland species found at the Sbaihia site - Pasture inventorying: Data collection using transects and quadrats (working in groups) - Demonstrations of image acquisition (Field data collection)	All
Thursday 4 November 2021		
08:30 – 10:30	Carrying capacity determination methods	Dr. Slim Slim
10:30 – 11:00	Coffee break	
11:00 – 12:30	Pastoral value determination methods	Dr. Mouldi Gamoun
12:30 – 13:30	Lunch	
13:30 – 14:30	Cactus pear's importance and potential.	Dr. Sawsan Hassan
15:30– 16:00	Coffee break	
16:00– 17:00	Rangeland vegetation mapping Image processing using Vegmeasure software	Dr. Mounir Louhaichi Dr. Sawsan Hassan



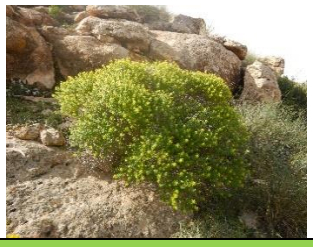



Group Training Course on

Silvopastoral systems: Rehabilitation and Evaluation

Hammamet 01 – 05 November 2021






Friday 05 November 2021		
08:30 – 10:30	Practical Exercise: to demonstrate and prepare a strategy for developing degraded rangeland site	Dr. Sawsan Hassan
10:30 – 11:00	Coffee break	
11:00 – 12:00	Silvopastoral restoration in semi-arid Tunisia : Expérience de la Direction Générale des Forêts (DGF)	Mr. Jamel Kailene
12:00 – 12:30	General discussion	Dr. Mounir Louhaichi
12:30 – 13:00	Certificate and closing	ICARDA CDU
13:00 – 14:00	Lunch	
14:00	Departure from hotel